

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Rejection under 35 USC § 102

Claims 1-10 stand rejected under 35 USC § 102 as being anticipated by Kalynushkin et al. U.S. Patent Publication No. 2003/0185977. Applicants respectfully traverse this rejection.

Claims 1, 2, 5 and 8

Applicants have amended claims 1, 2 and 8 to positively recite the securing of the substrate within the reaction chamber and to recite that, at the first chamber volume, there is a reaction of the precursor with the substrate to deposit the layer and that, at the second, larger chamber volume, the concentration of the precursor is reduced and undeposited precursor is removed to end reaction of the precursor. Support is found in the specification, particularly at paragraphs 0030, 00310 and 0033.

Applicants have further amended claims 5 and 8 to recite that the chamber has a pedestal to secure the substrate and to define the chamber volume by movement of the pedestal within the reaction chamber between an upper position, wherein the chamber has a first volume, and a lower position, wherein the chamber has the second, larger volume. Support is found in the specification, particularly at paragraphs 0027, 0028 and 0030, and in the drawings at Figs. 1-4.

Applicants have also amended the claims dependent on claims 1, 2 and 8 to conform the language therein to the aforementioned amendments. No new matter has been added by these amendments.

Kalynushkin '977 discloses the introduction of a vapor into an evacuated process chamber, the condensation of the vapor onto a heated substrate to form a liquid phase film, and the cooling of the liquid to solidify the liquid into a solid film. See Kalynushkin '977, paragraphs 0045 and 0046. Kalynushkin '977 discloses no "reaction" of the vapor with the substrate, but instead discloses merely a physical transformation. By contrast, in applicants' method there is caused a reaction of the precursor with the substrate to deposit the film. This is no mere transformation from one state to another as in Kalynushkin '977, but is instead a chemical reaction as illustrated by the examples in paragraph 0033 of trimethyl aluminum reacting to deposit a layer of aluminum oxide and tris-t-pentoxysilanol reacting to deposit a layer of silicon dioxide. Accordingly, Kalynushkin '977 cannot anticipate applicants' claims 1, 2 and 8 since there is only a physical transformation and no reaction of a precursor to deposit a layer on the substrate.

Kalynushkin '977 also does not disclose applicants' method of claims 5 and 8 because there is no disclosure of a pedestal movable within the reaction chamber between upper and lower positions to achieve the smaller and larger chamber volumes. The Examiner has taken the position that "in Figure 1, the support for the substrate will move up and down, making the substrate a platform movable between first and second positions." Advisory Action, p.3. Item 15 is an "external compartment" of the chamber that is "expandable and contractible to permit the volume of the process chamber to be modified." Paragraph 0068. Item 12 is the substrate, and its support is not described as

being movable. Notwithstanding the Examiner's contention, Kalynushkin '977 discloses no movement of substrate 12 with any change in chamber volume, let alone any movement between upper and lower positions as in applicants' claims 5 and 8.

Accordingly, applicants' claims 1, 2, 5 and 8 are not anticipated by the Kalynushkin '977 patent publication.

Claims 3 and 4

Dependent claim 3 requires purging the reaction chamber with a gas, and dependent claim 4 requires use of a vacuum, at the second volume to remove undeposited first precursor and any excess reaction product. Kalynushkin '977's disclosure of the use of an inert gas in paragraph 0067 and use of a vacuum in paragraph 0068 fail to teach or suggest that such inert gas or vacuum is employed when the chamber is at the second, larger volume. As such, there is no anticipation of the method of claims 3 and 4.

Rejection under 35 USC § 103

Claims 20-22 stand rejected under 35 USC § 103 as being obvious from Kalynushkin '977 in view of Vukelic U.S. Patent No. 5,268,034. Applicants respectfully traverse this rejection.

Dependent claims 20-22 recite that one or both precursors are diffused through a perforated plate above the pedestal in the reactor chamber. The Vukelic '034 patent discloses the use of a perforated plate in a fluid distribution head for a CVD apparatus. However, Vukelic '034 does not disclose any method of deposition that employs different chamber volumes, and does not make up for the deficiencies of the cited Kalynushkin '977 patent publication. Therefore, claims 20-22 are not obvious from the cited prior art.

New claims 23-26

New claims 23 and 25, dependent on claims 1 and 5, respectively, recite that the first layer is a different composition than the first precursor. New claim 24, dependent on claim 2, recites that the second layer is a different composition than the second precursor. New claim 26, dependent on claim 8, combines the subject matter of claims 23 and 24. Support is found in the specification at paragraph 0033, wherein it is disclosed that trimethyl aluminum reacts to deposit a layer of aluminum oxide and tris-t-pentoxysilanol reacts to deposit a layer of silicon dioxide. Since both the deposited layers of aluminum oxide and silicon dioxide are different compositions than their respective precursors, trimethyl aluminum and tris-t-pentoxysilanol, no new matter is added.

Claims 23-26 are not anticipated by or obvious from the cited prior art since Kalynushkin '977 deposits layers that are the same composition as the vapors, and are simply physical transformations of those vapors. As such, applicants submit that claims 23-25 are further patentably distinct over the prior art.

New claims 27 and 28

New claims 27 and 28, dependent on claims 5 and 9, respectively, recite that the first chamber section above the pedestal has spaced side walls and chamfered corners on lower ends of the side walls, that the pedestal has a diameter greater than the spacing between the first chamber section side walls, and that the pedestal has chamfered edges that correspond with the chamfered corners on the lower ends of the first chamber section side walls. Support is found in the specification at paragraph 0034 and in the drawings at Fig. 4, and no new matter has been added.

The Kalynushkin '977 and Vukelic '034 references do not disclose such structure and, accordingly, claims 27 and 28 are not anticipated by or obvious from the cited prior art.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Peter W. Peterson', written over a horizontal line.

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